

## CLAIMS

1. A process for the separation of metals, said metals being comprised as the metal oxides in a mixed oxide sample, the process comprising:
  - 5 (i) adding the mixed oxide to a molten salt electrolyte and cathodically electrolysing the oxide, the potential of the cathode being controlled so as to favour oxygen ionisation over deposition of metal from the cations present in the molten salt, and the applied potential difference being such as to facilitate selective reduction of one metal oxide at the expense of other metal oxides; and
  - 10 (ii) separating the metal from the remaining metal oxides.wherein said metal oxides comprise oxides of metals from at least one of the transition metal, lanthanide or actinide series.
- 15 2. A process as claimed in claim 1 wherein said mixed oxide sample comprises a mixture of two or more metal oxides.
3. A process as claimed in claim 1 or 2 wherein said metals comprise zirconium and hafnium and said mixed oxide sample comprises mixed zirconium and hafnium oxides.
- 20 4. A process as claimed in any one of claims 1 to 3 wherein the mixed oxide is provided as solid pieces of irregular size and shape, a powder, an amorphous mass, or a dense solid agglomerate.
- 25 5. A process as claimed in any preceding claim wherein the oxide is located in a mesh basket which forms the cathode.
- 30 6. A process as claimed in any preceding claim wherein the molten salt electrolyte comprises at least one chloride salt.

7. A process as claimed in claim 6 wherein the chloride salt is  $\text{CaCl}_2$  or  $\text{BaCl}_2$ .
8. A process as claimed in any preceding claim wherein the anode is a carbon anode.
- 5 9. A process as claimed in any preceding claim wherein the step of separating the metal from the remaining metal oxides is carried out by the use of dissolution and solvent extraction techniques, heating and slagging methods or electrochemical means.
- 10 10. A process as claimed in any preceding claim wherein said reduction of the selected metal oxide is carried out in one molten salt whilst separation of the metal from the other metal oxide or oxides is effected in a different molten salt composition.
- 15 11. A process as claimed in any one of claims 1 to 9 wherein said reduction of the selected metal oxide and said separation of the metal from the other metal oxide or oxides is performed in the same molten salt.
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